Tensor Diagrams

Summary

Basic Points of Tensor Diagrams

- Fixes Representation Problems
  - Co/Contravariant
  - Higher Order with more prongs
- Manipulation Tools
  - Epsilon Delta identity
  - Substitution
- Representation of Invariant Quantities

Good Things

- Complicated polynomials have compact representation
- Aids visualization of algebraic structure
- Factoring is easier (local control)
- Suggests invariant quantities

Bad Things

- Combinatorial explosion for high orders and high dimensionality
- Resultants and Discriminants not as pretty as I would like

Tools for experimentation

- Diagram drawing program that can drag connected networks
- Symbolic algebra program that specializes in epsilons

Work to do

- Relate invariant diagrams to geometry
  (Geom to Dgm, Dgm to Geom)
  - Raw diagram fragments
  - Cross ratio generalizations
  - Not enough diagrams to cover all geometric cases
- Push to higher orders/dimensions